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ELEVENTH REPORT

OF THE

STATE BOARD OF HEALTH

OF

MASSACHUSETTS,

FOR THE

SIX MONTHS ENDING JUNE 30, 1879.

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1879.

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REPORT.

OFFICE OF THE STATE BOARD OF HEALTH,
STATE HOUSE, BOSTON, June 30, 1879.

To the Honorable the Senate and the House of Representatives of Massachusetts.

THE State Board of Health herewith respectfully present their eleventh Report, for the period of six months ending June 30, when the Board was abolished and the new State Board of Health, Lunacy and Charity was created.

THE LAW REGARDING NOXIOUS AND OFFENSIVE TRADES.

In the case of the City of Cambridge *v.* Niles Bros., the evidence was given in detail in the Tenth Annual Report of the Board. The six points of inquiry there stated may be said, in general, to cover two questions: namely, (1) whether the establishment complained of would be a source of offence; (2) whether the water-supply of the city of Cambridge would be contaminated.

As regards the first point, it may be said, that, under the inspection of the Board, the drainage discharging into Alewife Brook, already contaminated by sewage, at first was offensive, but that the mixture of carbolic acid with it has to a considerable extent obviated that difficulty; that the soup can be mixed with the muck so as to avoid foul odors; that the machinery for manipulating the animals, the lard, the offal, etc., has been so carefully arranged, that no complaints of stenches have been heard of up to this date; that the hog-pens have been disinfected with dry loam, and that reasonable cleanliness has been observed.

With reference to the contamination of the soil, and thereby the water flowing into Fresh Pond, the rigid care exercised in making the basement and cellar floors of the buildings tight has assured the ground in the immediate vicinity from danger of being rendered impure. The drain-pipe is tight, and well cared for; and the soup may be so disposed of as to secure the

ground-water from any pollution, as may be seen from the results given below of experiments made for Messrs. Niles Bros. by Professor Nichols, as required by the Board.

Report on the Absorbing of the Soup from the Belmont Slaughter-House by Means of Muck.

At your request I have made a number of experiments with reference to the feasibility of disposing of the "soup" from the Belmont slaughter-house by absorbing it in "muck." It is not necessary in this Report to enter into the details of all the various experiments carried on in the laboratory and at the works: the details of some of them are given as an appendix.

The muck examined March 1, as it lay on the ground, contained eighty-two per cent of its weight of water, and readily loses seventy per cent on exposure to rather dry air at ordinary temperature. For the best absorptive effect, however, the muck should not be too dry. When moderately dry, as it would be in summer after several days without rain, the muck will readily absorb from one-fourth to one-third its bulk of soup. The best way, if labor were of no consideration, would be to mix the soup with as little muck as is necessary to hold it, to cover with a thin layer of muck, and to leave exposed to the air for at least ten or fourteen days ; then to mix the muck with an additional quantity of soup, and so on. In this way a large amount of soup may be incorporated, and the muck becomes more valuable as a manure. As it becomes rich, it is not absolutely odorless, and worms and maggots appear in it as in any decomposing animal matter: but, if *fresh* soup only be used, the mixing can be carried on without offence; and a very thin layer of unmixed muck thrown over the mixture retains almost all the odor. There is no advantage in mixing *fresh soup* with carbolic acid, and it would be a disadvantage if the muck were afterwards to be used for manure. Practically, on account of the labor involved, it would no doubt be found more advantageous to use a larger quantity of muck, to take less pains with the mixing, and to allow a longer interval between successive doses.

In order to ascertain how much soup is at present pumped on to the hill, I requested the keeping of an accurate record for some time. This was done from May 19 to June 7 (nineteen days in all), — seventeen working days. The total amount pumped during that time was, —

	CUBIC FEET.
Soup	1,900
Liquor from scalding-tub	1,000
Making in all	2,900

i.e., 154 cubic feet per day on the average, or 170 cubic feet for each working day. Allowing, for safety, four times its bulk of muck, this amount of 170 cubic feet would require for its absorption 680 cubic feet, or a pile three feet high and fifteen feet square, or two feet high and eighteen feet square.

In summer, if proper pains be taken, I think the soup may be safely mixed in the piles as they lie. It should be distributed over such an area, that, when it has soaked in and down, there should remain twelve or eighteen inches of muck beneath. This layer of muck will be the most efficient safeguard for the soil beneath. It is true, that, if the saturated muck be treated with a large amount of water, it is possible to leach out from it a quantity of organic matter, ammoniacal salts, etc., forming a liquid which would be valuable for a manure, but which should not be allowed to soak into the ground-water. With material like sample No. 15, a fall of rain of two inches would be absorbed by about eight or ten inches of muck, so that no liquid would drain from it. Of course, in time of continued rain, the soup should be distributed over a somewhat larger area than in dry weather.

In winter, there will be greater difficulty in securing the uniform distribution of the soup, and in preventing its passage into the gravel beneath. Supposing that, as the piles lie now, it were possible to rely in winter upon two feet of available depth of muck, to dispose of the entire discharge for five months (150 cubic feet daily for 150 days, i.e., 22,500 cubic feet), it would be necessary to allow 45,000 square feet; i.e., an acre of surface. This is supposing only one application of the soup. Probably three applications might safely be made during the five months: this would require 15,000 square feet.

If the mixing were made on a cement or other impervious floor, and under cover, so that there would be protection from severe frost, I should think that the entire discharge of five months (22,500 cubic feet) could, without doubt, be absorbed by 19,200 cubic feet (i.e., 150 cords), and possibly by 100 cords, or less. In winter there would be less danger of offence from the mixing, and on an impervious floor less care would be required to avoid over-saturation. It should be noted, that, other things being equal, the thinner the layer or pile of muck, the more soup in proportion will it absorb, because the weight of a thicker pile tends to squeeze out the liquid from the lower portions. It should also be said, that, the smaller the quantity of muck taken to absorb a given quantity of soup, the more handling would be required. Further: it is to be noted, that, as the muck becomes charged with soup, its capacity for absorbing, even at the same degree of dryness, becomes less, on account, no doubt, of the character of the solid matter left, when the water of the soup evaporates away. This solid matter chokes the pores of the muck.

In conclusion, I would say that I believe it is possible to absorb the soup in the muck without danger and without offence, and that this can be done in summer without special difficulty. I am also of the opinion that the process can be carried out in the winter, although with more difficulty. I should not be willing to recommend this method of disposing of the soup during the winter in the manner in which the soup is now applied. I think, however, that the process could be carried on safely, provided (1) that the distribution of the soup was not left to a common laborer, but was in charge of some person, intelligent and thoroughly conscientious; (2) that the soup should be distributed in such a way, and over such an area, that the muck should not be charged at any one time

with more than one-fourth its bulk of soup. This should be ascertained by actual calculation; and if the muck should be frozen, so as not to leave two feet in depth available as calculated above, the soup should be distributed over a larger area.[1] To do this in a satisfactory manner would require the expenditure of more labor than is at present employed.

I append some analytical notes, and accompany the report with samples of muck, and description of the same.

Yours respectfully,

Wm. Ripley Nichols.

Muck. Sample No. 7.

This is a sample of muck taken from the heap on the hill, and received by me March 1. It is said *not* to have had any soup in contact with it.

It contains, —

	PER CENT.
Water	82.2
"Organic and volatile" matter (including nitrogen 0.5 per cent)	16.5
Mineral matter	1.3
	100.0

In its present condition, it will absorb *three-tenths of its bulk* of water or other liquid.

Muck. Sample No. 14.

This is a sample of muck that has received a quantity of soup as follows: —

	CUBIC FEET.
Quantity of muck taken, 11 cu. feet	
Soup added April 5	3
Soup added April 19	2.5
Soup added May 17	1.6
In all	7.1

or $\frac{65}{100}$ of the bulk of the muck.

The soup first added had been treated with "dead oil;" afterward clear soup was used. The experiment might have been carried further.

In its present condition, this muck will absorb and hold 28 per cent; i.e., nearly one-third of its volume of water.

It contains 69.1 per cent by weight of water.

Muck. Sample No. 15.

This is a sample of a lot treated as follows: —

	CUBIC FEET.
Quantity of muck taken, 12 cu. feet	
Fresh soup added April 19	4
Fresh soup added May 7	2.7
Fresh soup added May 17	2
In all	8.7

or about 75 per cent of the bulk of the muck.

[1] N.B. — If the soup is distributed by trenches, the distance of the trenches from each other must be calculated with reference to the available depth of muck.

No doubt, at intervals of ten or fourteen days, additional quantities could be added. The sample in its present condition can absorb about 25 per cent of its bulk of water.

It now contains, —

	PER CENT BY WEIGHT.
Water.	76.1
"Organic and volatile" matter (including nitrogen 1 per cent)	14.7
Mineral matter	9.2
	100.0

It will be noticed that this sample contains about the same proportion of water by weight as the original muck. All the added water in the soup has evaporated.

It is true that the muck which was used for this experiment was not identical with that examined March 1 : it contained rather more mineral matter and fewer rootlets. It was of about the same degree of moisture.

Soup.

The soup, of course, varies somewhat; but a general idea of its character may be obtained from an examination of a sample received March 12. This sample contained 6 per cent of solid matter. The solid matter left on evaporating the soup contained 15.25 per cent of nitrogen.

Directions.

In the report which I made a few days since of my experiments with the muck, I expressed the opinion that the present method of disposing of the soup might be carried on safely, provided that some modifications were adopted, and that great care were taken.

It may be well for me to indicate the way in which I think the soup should be distributed.

If a simple trench be dug in the heap, and be then filled with soup, the liquid will soak away in all directions; but, if the material is uniform, it will sink rather more rapidly downwards than towards either side. If the trench is dug, as it naturally would be, parallel to the crest of the hill, the soup would be absorbed more rapidly on the lower than on the upper side. It is therefore important that the trenches used at any one time should not be too far apart, and that too much soup should not be put into any one trench, lest the soup should, in some places, soak entirely through the muck, and into the ground beneath.

The distance between the trenches should be about twice as great as the depth of the muck which it is proposed to make use of at the time. Thus, if the pile were three feet deep, I should leave the lowest foot as a safeguard, and calculate to use two feet for absorbing. In this case the distance between the centres of the trenches should be forty-eight inches.

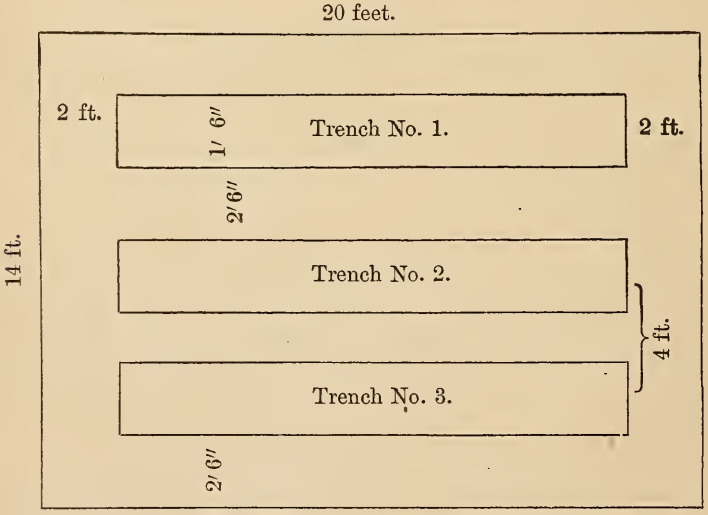
To distribute the soup I should lay out the necessary area (of which I will speak presently), and then dig parallel trenches at the proper distance apart. If the soup is brought, as now, in a pipe, these trenches need not be connected with each other; but it would be possible, if it were more convenient, to have them connected at one end with a single main trench

at right angles to the others. The soup might be allowed to flow into the connecting trench, and directed by temporary dams into the distributing trenches, — first into one, then into the next, and so on.

There should be some arrangement in the tank so that the person running the pumps can see the depth of soup at any time. This could be easily done by means of a float and index. If there are three ditches on the hill, when one-third ($\frac{1}{3}$) of the contents of the tank has been pumped, the pumps should be checked for a moment, so that the person on the hill would notice it, and turn the soup into the second ditch, and so on. As soon as the soup has soaked from the trench, the trench should be filled in with the muck at once.

As to the space necessary: Not considering for the moment the contents of the scalding-tub, which is not emptied every day, the average daily quantity of the *soup* is about 100 cubic feet. It runs up, however, so frequently to 140 cubic feet, that this latter amount should be allowed for. In order to absorb 140 cubic feet of soup, I should allow 560 cubic feet of muck. Supposing that we were using two feet in depth, it would be necessary to have an area of 280 square feet; say, a plot 20 feet by 14 feet. This area might be laid out as shown in the figure.

Of course, on the ground the measurements would not be made accurate to inches.



In this case I should run *one-sixth* ($\frac{1}{6}$) of the amount to be pumped into trench No. 1, then a like amount into No. 2, then into No. 3; and then go back, and run another sixth into No. 1 again, by which time a portion of the soup would have been absorbed. In summer, the trenches might be dug nine inches deep, and eighteen inches wide; and the calculation above is made upon that basis: but in winter they would be of necessity deeper. If they were two feet deep,

each trench would hold one-third ($\frac{1}{3}$) of the amount pumped, and it would not be necessary to go around twice. Other things being equal, the shallower the trenches the better, as the soup is more likely to be evenly distributed, and less likely to soak through the muck into the ground. When the trenches are more than nine inches deep, it will not be necessary to wait for the liquid to be entirely absorbed before the covering is begun; but, as a rule, there should be from six to nine inches of the dry material thrown over the portion which is thoroughly saturated.

It is not necessary that the trenches should be arranged as shown on the previous page; but three short trenches are to be preferred to one long one in securing even distribution.

It would not be difficult to calculate each day how large an area is required, knowing that the tank holds about $3\frac{1}{3}$ cubic feet of soup for each inch in depth. It would be simpler to take the same space every day; and that allowed above will, no doubt, be a safe amount.

The scalding-tub holds 280 cubic feet; and, when this is emptied, it will be necessary to employ for it alone twice the space allowed above for the daily supply of soup. In very rainy or long-continued wet weather, it would be better to allow a space half as large again; but the space allowed above will be sufficient as a rule, taking rain and all into the account.

Of course, the entire area of the heaps will be treated in systematic order; and I should judge that it would be safe to return to the same spot as often as once in four or five weeks in dry weather, and six or eight weeks in wet weather or in winter.

It has been proposed to cover the muck-beds in winter with meadow-hay, or other such substance, in order to lessen the depth to which the frost can penetrate. Any method of securing at least two feet in depth of muck, which can be used as an absorbent, is desirable. This could be accomplished by having the piles made thicker; but, on account of the labor of breaking through the frozen crust, I have no doubt the plan proposed would in the end prove more economical.

Yours respectfully,

Wm. Ripley Nichols.

In the case of complainants *v.* the Bradley Fertilizer Company, the Board have made careful inquiry, and consulted the counsel employed in the case, without being able to ascertain that any of the parties complaining had been troubled since the time of the hearing. Another complaint, however, was sent to the Board from four residents of Hingham, bearing date May 20, 1879, alleging that the place was a public nuisance, which ought to be abated. Since that time, a careful examination of the apparatus employed has convinced the Board that further improvements are practicable in the way of ventilation, and removal of foul gases. Professor Sharples, too,

is making experiments with reference to the possibility of more efficient destruction of the foul odors. Mr. H. P. Judson, in charge of the rendering department of the Brighton Abattoir, has visited the place with the Secretary of the Board; and the parties complained of seem very desirous of at once introducing every possible improvement, as agreed upon by these gentlemen. The petitioners do not at present desire a formal hearing.

During the eight years since the passage of the Act of 1871, the Board have had referred to them fifty-seven petitions under the law regarding noxious and offensive trades. In eight of these, no hearing was asked for, inasmuch as the action of the Board in the test case[1] was unsatisfactory to the petitioners, although it resulted in the removal of the nuisance, without destroying the business of the respondents. Six establishments have been satisfactorily regulated. In two, the parties complained of agreed to adopt the recommendations of the Board without a formal hearing. Thirty-three parties were ordered to cease and desist; and those decisions induced a number of others to give up their offensive methods of slaughtering, many of whom joined the Brighton Abattoir. In seven cases, no hearings were held, on account of some informality, because the questions involved did not come within the jurisdiction of the Board, or because no complainants appeared at the hearing. The petitioners in one case were allowed to withdraw.[2] These results express, however, far from the whole work of the Board under the law. Many complaints have been adjusted through improvements suggested by the Board; and in that way noxious and offensive trades have been so improved, that the complainants have been satisfied without a formal hearing. At the present time, although two large establishments are under the supervision of the Board, until they can be satisfied what is the proper judgment in each case, the more common result of petitions to abate nuisances is, that local boards act upon

[1] Against Messrs. J. P. Squire & Co. The petitioners, so far as the Board can learn, are now satisfied.

[2] In one case, the decision of the Board was set aside; but the jury ordered the party to adopt regulations essentially the same as those which were required by the Board (and not carried out) before the judgment to cease and desist was passed.

the advice of the State Board, or that the offensive features of the business alleged to be a nuisance are so far removed as to put an end to complaint.

Prevalent Diseases and Causes of Disease.

In continuation of the early practice of the Board, a weekly bulletin of prevalent diseases has been published, but only so far as this State was concerned, until the present year; when a memorandum was adopted, of which a copy is given below, for publication in "The Boston Medical and Surgical Journal," in order that physicians in the State might have fuller information of the approach of diseases dangerous to the public health: —

Reported Mortality for the Week ending June 7, 1879.

Cities.	Population estimated for July, 1879.	Reported Deaths in each.	Annual Death-Rate per 1,000 during the Week.	Percentage of Total Deaths from				
				The Principal "Zymotic" Diseases.	Pneumonia.	Diarrhœal Diseases.	Diphtheria and Croup.	Scarlet Fever.
New York	1,085,000	490	23.55	18.37	7.55	3.47	3.06	6.33
Philadelphia	–	274	–	11.31	3.65	4.74	2.19	3.21
Brooklyn	564,400	171	15.79	21.06	7.02	5.26	5.85	4.68
Chicago	–	108	–	14.81	9.26	–	7.41	2.78
St. Louis	–	132	–	18.18	2.27	12.12	.76	.76
Baltimore	365,000	125	17.85	19.20	2.80	8.00	4.80	1.60
Boston	360,000	133	19.26	12.78	6.77	5.26	3.76	.75
New Orleans	–	88	–	12.50	3.41	10.23	2.27	–
Cincinnati	–	84	–	26.19	5.95	2.38	3.57	14.28
District of Columbia,	160,000	85	27.69	27.06	3 53	18.82	2.35	3.53
Cleveland	–	41	–	9.76	14.63	2.44	–	4.88
Pittsburg	–	39	–	17.44	10 26	2.56	5.13	5.13
Buffalo	–	30	–	63.33	3.33	6.67	23.33	13.33
Milwaukee	–	37	–	18.90	10.81	–	16.21	–
Providence	101,000	24	12.39	25.00	–	4.17	16.67	–
New Haven	60,000	16	13.90	12.50	–	–	12.50	–
Charleston	57,000	39	35.66	10.26	2.56	5.12	–	–
Nashville	27,000	12	23.17	16.67	–	16.67	–	–
Lowell	53,300	14	13.69	14.29	–	7.15	7.15	–
Worcester	52,500	13	12.91	15.38	7.69	–	–	–
Cambridge	51,400	21	21.29	14.29	4.76	4.76	–	4.76
Fall River	48,500	10	10.75	20.00	10.00	–	–	20.00
Lawrence	38,200	13	17.75	23.07	7.69	–	–	7.69
Lynn	34,000	13	19.94	15.38	–	–	7.69	–
Springfield	31,500	9	14.90	44.44	–	–	22.22	22.22
New Bedford	27,000	10	19.31	–	–	–	–	–
Salem	26,400	10	19.75	10.00	–	–	10.00	–
Somerville	23,350	5	11.17	20.00	20.00	–	–	–
Chelsea	20,800	2	5.01	100.00	–	–	50.00	–
Taunton	20,200	5	12.91	–	20.00	–	–	–
Holyoke	18,200	8	22.92	12.50	–	–	–	12.50
Gloucester	17,100	4	12.20	–	25.00	–	–	–
Newton	17,100	5	15.25	–	20.00	–	–	·
Haverhill	15,300	10	34.08	50.00	10.00	–	50.00	–
Newburyport	13,500	4	15.45	–	–	–	–	–
Fitchburg	12,500	1	4.17	–	100.00	–	–	·

Two thousand and eighty-five deaths were reported: 382 from the principal "zymotic" diseases, 347 from consumption, 121 from pneumonia, 110 from diarrhœal diseases, 90 from diphtheria and croup, 83 from scarlet fever, 42 from bronchitis, 28 from typhoid fever, 24 from whooping-cough, 13 from cerebro-spinal meningitis, 11 from malarial fevers, 10 from measles, six from erysipelas, five from remittent fever, four from pleurisy, one from intermittent fever, and one from typho-malarial fever, none from small-pox (five *cases* are reported from Richford, a small town in the extreme north of Vermont). In the mortality from measles, cerebro-spinal meningitis, diphtheria and croup, whooping-cough, typhoid fever, pneumonia, and bronchitis, there is no noteworthy change. The decrease in scarlet fever and erysipelas continues. There is a slight increase in consumption, moderate from "zymotic" diseases and all causes; while the fatality from diarrhœal diseases is nearly double that of the previous week. In the nineteen cities of Massachusetts, with an estimated population of 880,850, there is shown a gradual increase in diarrhœal diseases, a decrease in scarlet fever, and no other noteworthy change.

From *bronchitis*, 18 deaths were reported in New York, six in Brooklyn, four in Philadelphia and Boston, two in Milwaukee, one in Chicago, St. Louis, Baltimore, District of Columbia, Buffalo, Providence, Cambridge, and Salem. From *typhoid fever*, 10 in Philadelphia, four in New York and Chicago, three in Cincinnati, two in Boston and Lawrence, one in Baltimore, Buffalo, and Cambridge. From *whooping-cough*, eight in New York, two in Philadelphia, Brooklyn, and Charleston, one in Chicago, St. Louis, Baltimore, Boston, Cincinnati, District of Columbia, Pittsburgh, Buffalo, Providence, and Chelsea. From *cerebro-spinal meningitis*, two in Baltimore, Buffalo, and Worcester, one in New York, Philadelphia, Cincinnati, Cleveland, Milwaukee, Lynn, and Somerville. From *malarial fevers*, seven in New York, five in Brooklyn, four in St. Louis, one in Baltimore and District of Columbia. From *measles*, six in New York, two in Cleveland, one in Brooklyn and Baltimore. From *erysipelas*, two in Buffalo, one in New York, Brooklyn, St. Louis, and Boston. The death-rate of the colored population in the District of Columbia was more than double that of the whites.

The weather was generally reported cooler and changeable, with light rains; the meteorological record for the week in Boston (latitude 42° 41′, longitude 71° 4′) being as follows: —

DATE.	Barometer.	Thermometer.			Relative Humidity.				Direction of Wind.			Velocity of Wind.			State of Weath'r.			Rainfall.	
	Mean.	Mean.	Maximum.	Minimum.	7 A.M.	2 P.M.	9 P.M.	Mean.	7 A.M.	2 P.M.	9 P.M.	7 A.M.	2 P.M.	9 P.M.	7 A.M.	2 P.M.	9 P.M.	Duration.	Amount in Inches.
June 1.	29.913	83	96	67	77	35	59	57	SW	SW	SW	10	16	12	C	F	C	—	—
" 2.	29.916	70	91	55	72	55	88	72	W	W	NE	6	12	14	F	O	R	—	.03
" 3.	30.078	50	55	49	100	100	100	100	E	NE	NE	15	14	9	R	R	R	—	.50
" 4.	29.895	60	66	50	100	97	91	96	O	S	SW	0	7	4	R	R	F	—	.88
" 5.	29.833	68	78	56	77	53	77	69	SW	SW	SW	6	12	1	F	O	F	—	.48
" 6.	29.764	63	77	53	72	74	55	67	O	O	W	0	0	20	O	F	F	—	.35
" 7.	30.014	54	62	45	63	28	56	49	NW	NW	W	15	17	4	C	F	F	—	.05
Week.	29.916	64	96	45				73	SW			1,629 miles						45	2.3

[1] O, cloudy; C, clear; F, fair; G, fog; H, hazy; S, smoky; R, rain; T, threatening.

For the week ending May 17, in 144 German cities and towns, with an estimated population of 7,315,369, the death-rate was 28.4, an increase of 0.1 over the previous week, indicating a decrease in consumption, diphtheria and croup, and typhus fever, an increase in scarlet fever, measles, and typhoid fever, while the other prominent diseases remained about the same. Three thousand nine hundred and ninety-three deaths were reported: 590 from consumption, 507 from acute diseases of the respiratory organs, 211 from diarrhœal diseases, 102 from diphtheria and croup, 62 from typhoid fever, 61 from scarlet fever, 56 from whooping-cough, 45 from measles, 21 from puerperal fever, seven from typhus fever, two from small-pox (Berlin and Augsburg). The death-rates ranged from 14.7 in Mannheim to 45.4 in Augsburg; Königsberg, 32.2; Dantzic, 21.2; Breslau, 30.6; Munich, 40.5; Dresden, 27.8; Cassel, 20.2; Berlin, 24.4; Leipsic, 24.6; Hamburg, 31.3; Hanover, 27.8; Bremen, 30.4; Cologne, 24.6; Frankfort-on-the-Main, 23.9; Darmstadt, 19.7. Also for the same week: Vienna, 33.6; Prague, 44.4; Paris, 27.7; Odessa, 30.7.

For the week ending May 24, in the twenty English cities and towns having an estimated population of 7,383,999, the death-rate was 21.4, — a decrease of 1 from the previous week, — with a decline in the mortality from respiratory diseases, diphtheria, scarlet fever, and fever; a very slight increase in measles and whooping-cough, considerable in diarrhœa, and nearly trebled in small-pox (London). Three thousand and twenty-nine deaths were reported: 327 from diseases of the respiratory organs, 109 from whooping-cough, 79 from scarlet fever, 75 from measles, 38 from fever, 35 from diarrhœa, 17 from small-pox, 12 from diphtheria. The death-rates ranged from 16.3 in Brighton to 25.1 in Norwich, 21.6 in London, 17.4 in Bristol, 23.1 in Birmingham, 23.8 in Liverpool, 24.1 in Manchester, 18.6 in Leeds. In Edinburgh the rate was 24; in Glasgow, 21; in Dublin, 35 (small-pox declining).

The sanitary condition of Astrachan and vicinity is reported to be good: typhus fever has become less prevalent. There is a slight increase

in small-pox in the large cities of Europe where it prevails, and a decrease in Poland.

The circulars with reference to prevalence of diseases in the State were sent this year for a quarterly period, instead of annually as heretofore, and to the boards of health, with the request that they would consult, in making their replies, the physicians employed by them, or the medical correspondents of the Board. Two hundred and twenty-three replies were received, or from about two-thirds of the cities and towns in the State. In this way a great deal of valuable information was received, although not of a kind which can be tabulated to advantage, or reported upon a standard constant enough to admit of comparisons between towns or even counties. It may be said in a general way, that pneumonia, rheumatism, neuralgia, and especially influenza, were unusually prevalent throughout the State. It seems desirable, in the future, to even further simplify the system of tabulation and reporting of diseases. The circular sent out for the first quarter of the year was as follows: —

OFFICE OF THE STATE BOARD OF HEALTH,
STATE HOUSE, BOSTON, March 25, 1879.

To the Chairman of the Board of Health.

DEAR SIR, — In order to receive important information with regard to the prevalence of disease throughout the Commonwealth, the State Board of Health have prepared the enclosed table, which they hope you will be kind enough to fill out and return at your earliest convenience.

If there is no physician on your board, will you please consult, in preparing your replies, the physician employed by you, and *especially the medical correspondent* of the State Board of Health, Dr. ——— ?

Please put a cross in the proper column, and opposite the name of each disease, to indicate whether it was absent, slightly prevalent, prevalent, or very prevalent; adding another cross if the particular disease was *also fatal*, and a zero if *not fatal:* for example, —

DISEASE.	No cases known.	Slightly prevalent.	Prevalent.	Very prevalent.	REMARKS.
Measles			×o		In March.
Scarlet Fever			××		For part of January.
Rheumatism		×			Never common here.
Small-Pox	×				One case of Varioloid in February.
Intermittent Fever,					A few cases *not originating here.*

Under the table may be put remarks with regard to these diseases or *others not on the list*, suggestions as to *causes of disease*, subjects which you desire the State Board of Health to investigate, etc.

In behalf of the State Board of Health,

Very respectfully yours,

CHAS. F. FOLSOM, M.D., *Secretary.*

Prevalent Diseases, First Quarter, 1879.

Reply from the Board of Health of the city or town of _____

Physicians consulted, _____

DISEASE.	No cases known.	Slightly prevalent.	Prevalent.	Very prevalent.	REMARKS.
Small-Pox					
Measles					
Scarlet Fever					
Cerebro-Spinal Meningitis					
Diphtheria and Croup					
Whooping-Cough					
Erysipelas					
Typhoid Fever					
Diarrhœal Diseases,					
Rheumatism					
Neuralgia					
Influenza					
Intermittent Fever,					
Acute Lung-Diseases					
Chronic Lung-Diseases [1]					

[1] Under this head, please note their *prevalence as causes of death.*

In the second quarter the following form seemed more desirable: —

DISEASE.	No case known.	Prevalent.	REMARKS.
Measles		×o	
Scarlet Fever		××	
Rheumatism			
Small-Pox	×		
Intermittent Fever			

Prevalent Diseases, Second Quarter, 1879.

Reply from the Board of Health of the city or town of_____

Physicians consulted, _____

DISEASE.	No case known.	Prevalent.	REMARKS.
Small-Pox			
Measles			
Scarlet Fever			
Cerebro-Spinal Meningitis			
Diphtheria and Croup			
Whooping-Cough			
Erysipelas			
Typhoid Fever			
Diarrhœal Diseases			
Rheumatism			
Neuralgia			
Influenza			
Intermittent Fever			
Acute Lung-Diseases			

It is especially in this connection that the assistance of the medical correspondents of the Board has been of very great value. Before local boards of health were established, even in our largest cities, they acted as reporters in matters relating to the public health. Their services were given cheerfully, and without pay. They have contributed largely to whatever success has attended the work of the Board, and deserve the gratitude of all those who have been interested in the development of the science of preventing disease. Their replies to the circulars of the Board from year to year embrace discussions with regard to a large range of subjects relative to sanitary laws, and a collection of facts, preserved for future use in thirty large volumes, which are of special value.

The distribution of circulars on matters relating to the prevention of disease has continued. Since the publication of the last Report, three more, as follows, have been added to the list. It is a cause of congratulation to the Board that these circulars have been somewhat widely reprinted outside of our own State.

DISINFECTION.

A CIRCULAR FROM THE STATE BOARD OF HEALTH.

Recent experiments made under the direction of the International Cholera Commission have shown that the ordinary methods of disinfection are inefficient, and, in practice, they have often failed to arrest the spread of infectious diseases.

As it is impossible to experiment directly upon the *unknown* low organisms, which are thought to be the means of transporting the various infectious diseases, the effects of chlorine and sulphurous acid were studied upon *known* living organisms; the probabilities being thought to be in favor of the theory that complete disinfection should destroy at least all known forms of life, although it may be true that the tenacity of life of the infective matter of various diseases differs, just as the degree of cold necessary to put a stop to yellow fever is much less than that required to arrest the spread of cholera.

Chlorine and sulphur fumes, in sufficient quantity, were found to be efficient in killing insects, fungi, bacteria, and infusoria; the objections to chlorine in houses being that it is more costly, that its use is more difficult, and that it destroys metals, textile fabrics, and colors.

The burning of ten grams of sulphur for each cubic meter of air-space, tightly closed, was found *not* to kill bacteria, infusoria, or all insects. Twenty grams, however, were proved to be sufficient for that purpose. One volume of water, when saturated at 59° F., absorbs thirty-seven volumes of sulphurous acid, — enough to kill all the low organisms found in putrid urine.

The following articles were found uninjured after several hours' exposure to an atmosphere in which twenty grams of sulphur had been burned to every cubic meter of air-space: A clock of steel and brass; rusty and clean nails; gold and silver money; a military epaulet; various colored silk articles; a colored rug; calico; down-pillows; a gilt-framed looking-glass; books; water in an uncorked bottle; flour; meat; salt; bread; apples; cinnamon; vanilla; cigars; wall-paper; oil-paintings; varnished articles; gas-fixtures; water-fixtures. A highly polished razor had a slightly cloudy appearance on its upper side, but that was easily rubbed off. The flour and meat were cooked and eaten, and the cigars were smoked, without any abnormal taste or smell being observed; in the bread not all of the observers noticed a slightly acid taste; the inside portion of the apples was unchanged, the skin was slightly sour; the water, after standing, had an acid reaction, but no decided taste or smell. Litmus-paper placed between the leaves of books and under the carpet was turned bright red. Many of the articles exposed had a decided smell of sulphur at first, but that soon disappeared.

The experiments seemed to show that clothing, bedding, and other articles may be disinfected without being changed chemically or injured; and it should be added, that practically this method has apparently accomplished perfect disinfection, as tested in Berlin.

If we may judge from these results, effective disinfection, by burning

sulphur, requires eighteen ounces to each space of one thousand cubic feet. The sulphur should be broken in small pieces, burned over a vessel of water or sand, so as to avoid danger from fire; and, if the room is large, it should be put in separate vessels in different places. The room should be tightly closed for six hours, and then aired: it is better that the room should be warm than cold. Of course, efficiently disinfected air is, during the process of disinfection, irrespirable. Most articles may be disinfected in this way, if hung up loosely in the fumigated chamber, although it would be an additional safeguard to expose any thing thick, like a bed-mattress, to prolonged heat at a temperature of about 240° F.; and, indeed, heat must, with our present knowledge, be considered the best disinfectant. With this end in view, local boards of health are advised to procure furnaces and laundries, as is commonly done in other countries, to be used for the sole purpose of disinfecting articles which have been exposed to the infectious diseases, as recommended in the Ninth Annual Report of the State Board of Health, and described by Dr. A. H. Johnson, in an exhaustive paper on Scarlet Fever (pp. 255 *et seq.*), in that report. Of course, a much simpler disinfecting furnace than that described will answer every purpose. For ordinary use, in disinfecting *houses*, the sulphur process is the best.

A solution of chloride of zinc (one part of Burnett's disinfecting fluid to two hundred of water) very quickly kills bacteria *which have been placed in it*, and arrests putrefaction. Caustic lime serves equally as well (1 to 100), but leaves a sediment not always easy to remove. Carbolic acid in sufficient strength to be effective (1 to 100) is more expensive, and of disagreeable odor.

It is needless to add that "disinfectants" used in sufficient quantities to destroy bad smells do not necessarily kill microscopic living organisms; and it is not supposed that they directly influence the so-called "germs" of the infectious diseases, unless concentrated to the extent which has been mentioned.

Finally, fresh, pure air acts as one of the best "disinfectants" by enormously diluting the infectious matter, and, under certain conditions, including time, must render it inert to all effect, even if not quickly destroying it, as many think is the case.

State House, Boston, April, 1879.

A CIRCULAR TO LOCAL BOARDS OF HEALTH.

THE CARE OF YOUNG CHILDREN.

The diseases of children which cause the greatest mortality occur mainly during the hot months, or immediately thereafter, and are due largely to overcrowding of population, in cities and in thickly populated parts of towns. They are much aggravated, if not directly caused, by filth of all kinds, especially by filth putrefying under the influence of summer heat.

Therefore infants and children should be taken, so far as it is possible,

during the summer, to places where the air is clean and cool: if not to live in the country or at the seashore, then to parks, open squares, beaches, etc., for a day, or for as many hours at a time, and as often as may be. All sources of impure air in and about the dwelling should be avoided; the drainage should be carefully looked after; the water-supply should be pure; no sink-spouts should pour filthy water on the soil; there should be no untrapped sinks or drains, no stinking privy or pig-sty, no ill-arranged water-closet,[1] no arsenical wall-papers, etc., to poison the air. Soiled clothing, diapers, etc., should be promptly removed from the rooms.

A baby should not sleep in the same bed with another person, and should have plenty of fresh air day and night.

Food.

Improper food is directly or indirectly connected with at least one-half of the deaths of young children. Of all the deaths under one year in Massachusetts, more than one-quarter are from diseases of the digestive apparatus, mainly of diarrhœal character. Errors in diet cause also a vast number of deaths which do not show their real nature in the mortuary records; — for instance, very many cases of "teething," "convulsions," "marasmus," "atrophy," "wasting," "hydrocephalus," etc., come under that head; and, furthermore, many cases of disease of the lungs, otherwise trivial, become dangerous because occurring in children previously weakened by indigestion.

The new-born child should, if possible, live altogether on the milk of its mother, or, failing that, of a *perfectly healthy* wet-nurse, unless, indeed, when the mother has not quite enough milk, the physician thinks best to supplement it with bottle-food. If neither the milk of the mother nor of a wet-nurse can be had, the milk of the cow or some other animal may be used instead; and this should be supplied fresh night and morning, — not necessarily from one cow.

Milk warm from the cow can usually be taken undiluted by infants of any age; if it has time to cool, it should be thoroughly chilled immediately after milking, before being used for feeding infants.

Whether the baby be nursed or bottle-fed, the meals should be given at regular intervals during the day, every two, three, or four hours, according to the age and vigor of the child; during the night, only once or twice, for one or two months; after that, once or not at all.

The infant should not be allowed to go to sleep during its meals, but should be made to nurse continuously, except for occasional rests of a few seconds, until it has taken all it wants. By this means it soon learns to take just the quantity it needs; and, being neither hungry nor over-filled, it sleeps or lies comfortably between meals.

Crying should not always be considered a sign of hunger, and nursing out of meal-times should never be used to quiet the child.

Both breasts should be used at each nursing; and, when the milk has any tendency to be scanty, each breast should be given twice at each meal.

[1] See circulars on House-Drainage, and on Soil-Pipes and Drains.

It is not always easy to tell whether a child gets as much milk as it ought. Not infrequently when the mother or nurse is losing her milk, and the child is obviously failing, it will yet seem to be satisfied at each meal, probably because it has learned not to expect more, and has ceased to hope for it. Then it suffers for want of sufficient food, and should, of course, be fed from other sources. Drawing on an empty breast, too, is in itself injurious to the child.

It may be said in general, that the food which suits the mother will make good milk. It would be better to abandon most of the current *popular* theories as to what is or is not suitable for nursing-women. Perhaps the most objectionable one is that milk is indefinitely increased by taking large quantities of fluid. Certainly enough extra fluid must be taken to supply the extra amount demanded by the breast. Such vegetables and fruits as give the mother indigestion, or such as are found by experience, from some individual idiosyncrasy, to disturb the child without disturbing the mother, should be avoided; but, as a rule, the mother should eat what she usually finds conducive to her health.

It should generally be left to a physician to decide whether or not a mother is able to nurse her child. Mothers often think their child is not thriving on breast-milk, when the real difficulty arises from faulty habits of nursing, irregularity of meals, etc.

Cow's milk is usually, on the whole, the best material for supplying the place of the natural food. The constituents of cow's milk and of human milk are mainly water, casein, fat, and sugar, although not in the same *proportions;* but that is not the most important difference between the two milks, as may be seen when they are curdled. The curds of human milk are soft and flocculent; those of cow's milk tough and leathery, with a tendency to contract and become more and more hard.

Pure cow's milk is not often well digested by infants under six months old, nor always by older ones. The hard curds that it forms are often vomited, or pass through the bowels, and appear in the discharges. It therefore becomes necessary to dilute it with water or some other material. When water is used, it is commonly found best to give from one-third to one-half milk and from two-thirds to one-half water for the first month or six weeks, and then gradually to diminish the amount of water until at the age of six or eight months the milk is given without water. If the milk has been watered before it is bought, as sometimes happens, it may be given in larger proportion. These rules for diluting milk may only serve as a general guide; for all children have not the same powers of digestion, and some milks contain much more water than others. The greatest care should be taken that the water for diluting milk be not contaminated. If there be any suspicion of its impurity, it is well to boil it, as some physicians recommend in all cases. As human milk contains a larger proportion of cream than cow's milk, it is usual to let the milk stand a while, and take the upper part of it, after the cream has begun to rise. For a similar reason, sugar often is added to the diluted milk; usually ordinary cane-sugar, but sometimes by preference sugar of milk, on the theory, that, resembling the natural sugar of the human milk, it will be less likely to cause indigestion.

If large curds are vomited or passed by the bowels, an alkali should be added to the milk (from two to five grains of bi-carbonate of soda or bi-carbonate of potassa, or from one teaspoonful to a tablespoonful of lime-water, in each bottle of food[1]).

The test of a method of feeding is the health of the child; and when, as often happens, children do not thrive well on milk simply diluted, there are several ways of preparing it that will usually make it more digestible. The principle is essentially the same in all; namely, to thicken the milk, and thus prevent the lumping of the curds. Barley, oatmeal, Graham-meal, flour, arrow-root, corn-starch, rice, gelatin, isinglass, and gum-arabic are all used in this way, and then all answer about the same purpose. They contain, it is true, some more, some less nourishment, but much less than the milk with which they are combined; so that their effect, when thus used, may be regarded as chiefly mechanical. The starchy parts of them are not absorbed by young infants, except to a very slight extent.

One of the best home-made preparations is of oatmeal. One table-spoonful of coarse oatmeal is left to soak over night in a quart of water. In the morning it is boiled down to a pint, and strained while hot. When cool, it is of the consistence of jelly, and should be mixed with milk, generally in equal parts, only when about to be used. Pearl-barley may be treated in the same way, and is preferable, if the bowels are relaxed.

There are many manufactured articles in the market, some of which are valuable and may be advantageously employed under medical advice.

Condensed milk sold in open cans is milk simply deprived of some of its water, and has the advantage over undiluted milk that it is less likely to sour in the thick state in which it is kept until ready for use. The taste of it is somewhat changed by the process of condensation, so that the flavor resembles that of boiled milk; but this does not seem to make it less easily digested or less nutritious. It should be diluted with rather less than four times its volume of water, to make it equal to ordinary milk. It cannot be kept in warm weather more than three or four days.

The milk sold in sealed cans is condensed when fresh, and seems to retain the qualities of fresh milk for a very long period, unless it is diluted; so that, in spite of containing a great amount of sugar, the best preparations of it are sometimes useful.

Artificial food, when given, should be about blood-warm.

Babies brought up by hand may take their food from a spoon, a cup, the so-called china duck, or from a nursing-bottle. The bottle has the advantage that the food is obtained by the natural process of sucking: the flow of the food is uniform, and not too rapid. The spoon, cup, etc , have the advantage that they are more easily cleaned, and are decidedly preferable, if the nurse or mother will not use great care.

The bottle should be of the simplest possible arrangement. The best

[1] To make lime-water, put a piece of unslaked lime, as large as a hen's egg, in an earthen vessel, and pour on it slowly a gallon of pure cold water. After a few hours, skim it, and pour off the clear fluid, which should be tightly corked in bottles.

consists of a nipple of soft black rubber, with holes small enough to prevent a too rapid flow, snapped over the lip of a plain bottle with a tapering neck. It should contain eight ounces for young children, and ten or twelve for older ones.

The bottle and nipple should be rinsed out in cold water, and then left entirely immersed in water until wanted for use again. If this is faithfully done, no other washing is required. But, if the milk dries upon the glass or the rubber, it sometimes cannot be removed except with carbonate of soda, scalding, and scrubbing. When thoroughness cannot be assured, it is well to use a weak solution of carbonate of soda for rinsing regularly.

Tubes and joints are objectionable, unless *extraordinary care* can be assured in keeping them clean. They should be put in a weak solution of common cooking-soda, and be rinsed thoroughly before use.

Weaning.

The infant should be weaned in one of the cool months, not between May and October : it should be about one year old, not younger than nine, nor older than fifteen months. It is very injurious for both mother and child to continue the nursing too long.

Long before the time of weaning, the infant should have become accustomed to other food, in addition to the breast-milk : it should have learned to drink milk, or one of the preparations already mentioned, for one meal. At seven or eight months, this may be varied by the addition of softened bread, and by giving simple meat-soup or beef-tea. It is not particularly desirable to give to healthy children meals of concentrated soups or expressed beef-juice; the true aim being, not to crowd the child with nourishment, of which it can easily get enough, but to encourage a vigorous and natural digestion.

As the time for weaning approaches, the number of food-meals may be increased so that the child will be induced to give up the breast with very little difficulty.

Only simple food should be given, and at regular times, avoiding pies, cakes, unripe or over-ripe fruits, soothing-sirups, patent medicines, etc.

Bathing and Clothing.

The infant should be washed thoroughly all over every day once, and during very hot weather twice.

For a few weeks the water should be at about blood-heat or a little below it, from 98° Fahrenheit down to 95° Fahrenheit; and, later, it should be lowered so, that, at an age varying with the health and vigor of the child, the water should be warmed only enough to take off the chill.

It is better to put a baby into a bath of water than to bathe it in the lap; and the water should, if possible, be deep enough to cover it up to the neck.

When no bath-tub is to be had, the best thing to use is the ordinary tin wash-boiler.

The best way to avoid a chill after the bath is to wrap the child at once in a warm cotton sheet or towel, placed on a warm blanket.

The best clothing is that which is warm, and at the same time light. Flannel is the best material for all seasons of the year. Especially in the cool weather following the heat of August, infants are very susceptible to the influence of cold, and at that time they should be looked after with particular care. It is better that the bands of pinning blankets and skirts should be of flannel rather than cotton. Loose blankets and shawls that easily change their position on the body, or get forgotten occasionally, are undesirable garments. The shoulders, arms, and legs should be covered in cool weather, especially during the first four months; the stomach and bowels should always be carefully protected from cold.

Quite as much attention should be paid to keeping the child cool in summer as to keeping it warm in winter. Overheating is a common source of sickness.

Office of the State Board of Health,
State House, Boston, June, 1879.

Note. — Copies of this circular may be had upon application to the Secretary of the State Board of Health.

NOTE.

Ridge's food, imperial granum, prepared groats, and prepared barley are manufactured articles; and the exact peculiarities of them are not known, except that they are found to suit the digestion of many babies. As a rule, they should be given in such proportion, that the food, when ready for use, will pass easily through the nursing-bottle.

Two preparations, Nestlé's and Gerber's lacteous farina, are exceptions to the above rule, and are real foods; that is, they really contain milk, but in a dried and powdered form. With the milk is supposed to be combined a powder of bread-crust, which is rich in dextrin, a soluble substance resembling starch. Unfortunately, these preparations, though very valuable forms of food, are quite expensive. It cannot be otherwise than a misfortune, also, that they are made by a secret process.

It is claimed that Horlick's (American) and Mellin's (English) food contain all the constituents of Liebig's soup for babies, except milk.[1] They appear to be identical with each other, and are valuable as additions to milk.

CIRCULAR TO LOCAL BOARDS OF HEALTH.

HOUSE-DRAINAGE.

The first principle in house-drainage is, that there ought never to be any constant bad odor connected with it. If there be such, it is an indication that *there is a defect somewhere*. Occasional offensive smells also

[1] Baron Liebig's soup for babies, made of malt, flour, bicarbonate of potash and milk, is a very valuable food. It requires, however, more than half an hour's cooking every day, and its place seems to be fairly supplied by Mellin's and Horlick's food.

usually reveal imperfect workmanship, incorrect methods, bad ventilation, or some failing in the quality of materials used or in the proper working of some of the various parts.

As the different means of allowing escape of sewer-gas into dwellings frequently exist for a long time without being detected, and as people may become so habituated to the daily presence of bad smells as not to notice them, it is evident that as much of the plumbing and of the soil-pipes as possible should be *readily accessible to frequent inspection*, to allow of the application at once of the proper remedy for each defect. Inside the house the drains should be of iron, with flange or well-tamped lead joints, and not be so laid under the cellar-floor that they cannot be seen.

The danger to a healthy, vigorous person from breathing foul air, so far as the specific diseases are concerned, is much less than is commonly supposed; yet it is a risk of so great an injury that it should, of course, be avoided. If the foul air comes from a general sewer-system, especially when the sewers are so badly constructed as many in our cities, or if from defective drains, allowing filth to accumulate and putrefy, the danger is ordinarily much greater than from filth before decomposition has begun; and the sense of smell, too, does not so constantly furnish a warning of its presence.

For a temporary purpose, and especially to arrest decomposition and destroy bad odors, disinfectants serve a good purpose; but they are simply palliatives at best, because they *cannot be efficiently applied* directly *to all places* where filth is likely to accumulate; and they should be depended upon only when the radical measures of prompt and effective removal of all filth, with thorough ventilation, cannot be adopted. Chloride of zinc (Burnett's Disinfecting Fluid), one part to four hundred of water, and carbolic acid, one part to a hundred, kill the *known* low organisms (*fungi*, *bacteria*, *infusoria*) immersed in them, and in that proportion are probably thorough disinfectants;[1] but, of course, the concentration must be increased according to the amount of filth in the fluid to be disinfected.

Drains should be of such a size (not over six inches in diameter for an ordinary house) and shape (round) as to concentrate the flow of drainage, and prevent deposits; smooth inside, with continuous lines, free from offsets or jogs at the joints, of suitable inclination (one foot slope in twenty-four will usually be the least that is safe, unless a flush-tank is used), and properly connected with the soil-pipes at one end and the sewer at the other, strong, and of durable material (glazed earthenware or iron). They should be used for all *liquid* refuse, but never for garbage or ashes; and no filth or dirty water should be thrown out in back yards, except to be taken up at once by vegetation ; and it should never be allowed to run in gutters in the streets. The common defects in drains cannot all be mentioned here, but are fully discussed in articles by E. S. Philbrick, C.E., and E. C. Clarke, C.E., in the seventh and tenth Reports[2] of the Board.

[1] Three pounds of green copperas and one pint of carbolic acid to a pail of water may be used as a cheap and useful palliative of filth which cannot be promptly removed.

[2] These Reports may be found in most of the libraries in the State, or upon application to the board of selectmen.

As a defective house-drain may affect not only the occupants of the house, who may not be owners (and many of whom may not be even tenants), but even a whole neighborhood, every house-drain at least — and better, also, soil-pipes and plumbing — should be constructed and arranged according to approved plans, and be under municipal inspection and control. A plan of the work should always be put on record, both for future use, and because its preparation will insure some forethought and care in its adaptation to the requirements of house and sewer, — and particularly as neither owner nor mechanic can commonly prepare such plans with accuracy and nicety, without calling for advice on some one skilled in that work. It would be well to have two copies of ground-plan and profile, — one to be kept at the house, and the other with the officers in control of the sewer department. The plans should contain *all the works projected*, in connection with the supply of air [1] and water to the house, together with the apparatus for removing the water, after its use, from sinks, water-closets, bath-rooms, etc., through soil-pipes, drains, traps, etc.; and this plan should include *grades* also of all important parts (cellar, drains, catch-basins, yards, sewer).

Drainage of wet sites for houses is also of very great importance, as well as drainage to remove filth; when needed, the same principles are involved, and the same processes applied in its application, as in agricultural drainage. Tile-drains, from two to five inches in diameter, with a fall of not less than one foot in one hundred, are the best for that purpose: they should be laid at least six inches — but better two feet — below the level of the bottom of the cellar. They should never be used to carry away kitchen-slops, or indeed any thing except the water from the soil and subsoil. They should be placed about twenty feet apart in tough soil or clay, and from that distance to forty feet apart in gravel, etc. *Damp cellars are injurious to health:* they often produce consumption, pneumonia, rheumatism, neuralgia, and predispose to diphtheria and other diseases, although strong, vigorous persons frequently do not feel their immediate influence upon themselves, and it is not always felt upon their children. [See a paper by Hon. H. F. French, in the Fourth Annual Report of the Board.]

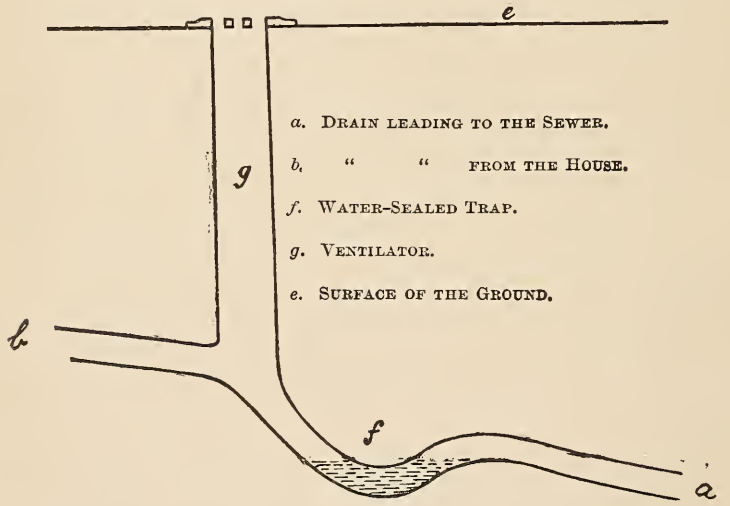
Few sewers are so well constructed as not to require to be isolated from houses by traps. An excellent method of securing this result is shown by the cut, Fig. 1. The ventilator *g* may be made of brick and cement as a manhole, with arrangements for packing, to prevent freezing in winter, and excellent traps are in the market, in one piece, to be used in that case; or it may be continued to the roof by a pipe, which should be used only when there is a trap between it and the sewer. The current of air will usually be found downward, and then upward, and out through the soil-pipe. If extended to the roof, it should not have its upper extremity near a window, or close to a chimney. If used also as a rain-water spout, — a plan which has its advantages for flushing the drains

[1] It occasionally happens that a defect in a drain communicates with the air-supply to a furnace, and so is the means of distributing foul air over the house. Of course the two should never be so near together that such an accident can be possible.

occasionally, — it would be well to have another vent from the drain to allow the escape of compressed air, *provided* the soil-pipe and rain-water spout are ever used for discharging water at the same time.

The best arrangement of the soil-pipe is to carry it up through the roof. In houses already fitted with pan-closets, and not more than two to each soil-pipe, sufficient ventilation may often be got by a pipe at least two inches in diameter, the top of which should not be near and at the level of windows or chimneys. A soil-pipe may be well ventilated, too, by a pipe passing into a *constantly heated* chimney, provided it be so arranged as not to conduct "sewer-gases" into any other part of the house, either by down-draughts through other flues, fire-places, etc., or by insecure joints, and contraction and expansion of the pipe from changes of temperature. If there are several points of discharge into a single soil-pipe, there should be a long vent-pipe similar to that described on p. 453 of the seventh Report of the Board, or a vent into the external air from each, to prevent "siphoning out" of traps.

FIG. 1.



Water-closets, sinks, basins, and bath-tubs should be so securely trapped as to prevent the admission of foul air. Generally speaking, water-closets should be ventilated by direct communication with the external air, and they should never be in sleeping-rooms. A ventilator directly under the seat of the water-closet, and passing with the precautions already given, into a chimney, serves a very good purpose in old houses, when the arrangements cannot be made to fulfil the best requirements, or wherever a constant draught of air can be maintained through the closet-door and out through the ventilator. It is well not to place water-closets in cellars.

Of the various patterns of water-closets in use, the smoothest, the simplest, and those easiest to keep *clean*, *well trapped*, *fully ventilated*, and

thoroughly flushed, are the best.[1] Many are now in use which do not fulfil these indications, but there are others in which the faults of the pan-closet and of the old ill-flushed hopper-closet are corrected: whichever are used, the bowls should be often washed with soap and water.

Wash-basins should not be in sleeping-rooms, unless protected by *efficient* traps; and even then it is safer to guard against a possible accident, and have them in an adjoining room.

In view of the fact that many cities have appointed boards of health by virtue of the authority conferred upon them by chap. 133 of the Acts of the General Court of 1877, the Board desire to call their attention to the following important section of that Act: —

"Section 5. *Said boards of health, and the board of health of the city of Boston, in addition to the powers conferred upon them by existing statutes, are hereby authorized to prepare and enforce, in their respective cities, such regulations as they may deem necessary for the safety and health of the people, with reference to house-drainage, and its connection with public sewers, where such connection is made.*"

Gross defects in house-drainage may be detected, and minor defects may be commonly found, by dropping a half-ounce of oil of peppermint into the soil-pipe at its opening above the roof, or through the topmost sink or water-closet in the house; a few quarts of water — better hot — should be poured down after it. If *another* person than the one who has used the peppermint visits the various rooms, cellar, closets, etc., there generally will be no difficulty in ascertaining where a leak may be. A better method still, but very costly, is to use hydrostatic pressure, as is the custom in testing gas-pipes. In any case, the opinion of an inspector or person familiar with the matter is desirable.

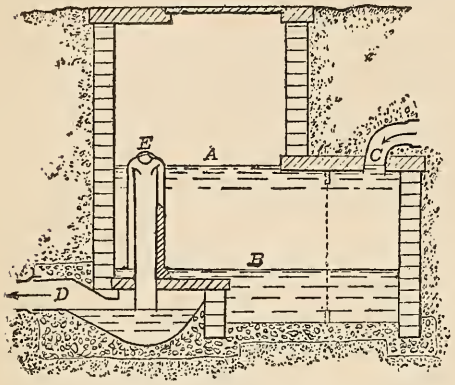
When houses are left vacant for a time, the traps are apt to become dry, — an evil which should be avoided, so far as is possible, by flushing them from time to time, and always a few days before re-occupation of the house; and this flushing of the traps should be supplemented by free ventilation with open windows.

Where water-closets are used, and there are no sewers, the best disposal of the sewage is by the flush-tank and irrigation under the surface of the soil, as described on p. 334 of the seventh, p. 135 of the eighth, and p. 11 of the ninth, annual Report of the Board. (See Fig, 2.[2]) If cesspools

[1] Directions with reference to these points may be had on application to the sanitary engineers intrusted with the drainage of houses; as it is not the purpose of the Board to enter into details, but to insure proper care and forethought in matters so vital to the health of the community.

[2] Reprinted, by kind permission of Messrs. Harper & Brothers, from an article in the June number of the "New Monthly Magazine," by Col. G. E. Waring, jun., who has also drained the town of Lenox on this principle. "A is the surface of the water when the tank is full, and B when it is emptied. The capacity of the tank between the lines A and B is about five barrels. In front of the entrance there is a wire screen to prevent the passage of coarse material. This is held in place by wooden wedges, and may easily be removed for cleansing. The depression below the line B is for the accumulation of solid matters which may not become decomposed. A portion of the tank is carried up to the surface of the ground, with a movable cover for a man-hole. E is Field's automatic annular siphon, by which the tank is emptied as soon as its

must be used, they should be tight, and often emptied by the odorless process, or else have their contents pumped out on the surface of the ground for fertilizing purposes, where that can be done without causing a nuisance. If the sewage is placed on the soil in the morning of a dry, clear day, when the sun is shining, and in places where it may be readily absorbed by the earth, the odors from it are the least offensive. In very loose soil, and remote from dwellings, ordinary loose-walled cesspools may be used without danger for a time; but the custom cannot often be entirely approved. An overflow into a stream or upon the land from a tight-walled cesspool often creates a nuisance, — a difficulty which has been simply and successfully provided for by means of sub-surface irrigation through porous drainage-pipes from the top of the cesspool, laid in the same general way as for use with the flush-tank.



Sewers are of the first importance for removal of sewage, where the water-carriage system is adopted. When for any reason they cannot be introduced, the greatest consideration should be used before it is decided to introduce water-closets, if the result must be to drench the soil with filth and water by means of loose-walled cesspools. The water-carriage system, however, in the opinion of the Board, *if sewers and house-drainage are planned and constructed as they should be*, is by far the most satisfactory, both from a sanitary point of view and as a civilizing agent; and, even where the sewers are very defective, the house-drains may often be so isolated from them by traps and good ventilation as to make the evils of water-carriage less than those of any other system, provided there is an abundant water-supply.

In some cases, where the soil has been polluted so as to endanger the wells, and a public water-supply is not practicable, rain-water may be stored for use; but it should be filtered, and kept free from contamination by dust, dirt, drainage, etc. The water first coming down in rain col-

contents rise high enough to flow over the top of its inner (and longer) limb. The short limb is a dome enclosing the inner limb, with a water-way all around its bottom, reaching to the line B. The drainage flows into the flush-tank, where it is held until the top of the siphon is reached. The whole amount (five barrels) is then discharged with great rapidity into the main sewer (D), washing it clean from end to end. The flow of sewage alone is sufficient to remove all accumulations from the sewer." See also pp. 295–298, 482, 483, and 522, of the *second edition* of Mr. Baldwin Latham's Sanitary Engineering.

lects impure matter from the atmosphere and from the roofs of houses, and this should be thrown away. The rest may be filtered through a brick wall renewed every three months, or by means of animal charcoal, quartz-sand, spongy iron, sponge, cotton-flannel, etc., *frequently cleaned*, although no one of these methods is so good as filtration through clean, well aërated soil. [See "Household Filtration," in an article by Professor W. Ripley Nichols, in the ninth Report of the Board, pp. 205 *et seq.*]

Where the constant system of supply is so universally used as in this country, cisterns for drinking-water are seldom depended upon, except for rain-water. Any overflow-pipe from them should always be kept from discharging directly or through a rain-water spout into a drain or sewer, because such an arrangement would serve as a means of conducting "sewer-gas" into the cistern; and a trap would not be in such case a sufficient protection.

Important as are the proper construction and maintenance of soil-pipes and drains, their thorough usefulness depends also upon a sewerage system adjusted to the wants of each city and town where water-carriage is adopted. Sewers should always be laid according to a definite plan embracing the whole area to be sewered. They should be skilfully built, smooth inside, in straight lines, suitably ventilated, adapted for ready and thorough inspection, of proper size, shape, grade, etc.; they should be tight, and so constructed as not to allow percolation of filth through their walls into the soil and air, although, of course, they may properly be porous enough to drain the soil of superfluous moisture. *The sewage should start from the houses, and go in a continuous current, without allowing any deposits or stopping, until it reaches its destination before putrefaction has begun.* Details with reference to this matter may be found in the eighth Report of the Board, pp. 139 *et seq.*, in an article by E. S. Chesbrough, C.E.

Office of the State Board of Health,
State House, Boston, May, 1879.

Note. — Copies of this circular may be had upon application to the Secretary of the State Board of Health.

Of the following two circulars, the first was distributed quite widely in those cities which failed to avail themselves of the privileges of the law authorizing the appointment of boards of health; the second was sent to physicians and boards of health throughout the State.

State House, Boston, March, 1879.

Dear Sir, — The State Board of Health desire to respectfully call your attention to the enclosed act with regard to boards of health, hoping that you will have the kindness to call attention to its very important provisions so far as you may be able to do so. The Board cannot better express their own views of the great value to every com-

munity of an efficient local health department than by quoting as follows from the inaugural address of the Mayor of Somerville: —

"As I took occasion a year ago to express the opinion that the city had made a mistake in voting to accept the health act passed by the General Court in 1877, I desire now to say that the experience of the past year has led me to an entirely different opinion from the one then expressed. The Board of Health has been in successful operation since its organization in the early part of the year; and, beside relieving the city council of a large amount of work, I am satisfied it has accomplished more in the way of abating a large number of nuisances than it would have been possible to accomplish under the old law. It has also commenced a systematic examination of the house-drainage throughout the city, and to enforce wholesome rules and regulations in all cases of contagious diseases. Without attempting to assign the cause, it is a matter of congratulation that during the last three years the death-rate among us has been gradually diminishing. The following is the number of deaths in our city since its organization: —

		Rate per 1,000.
1872	400	24.30
1873	425	21.70
1874	490	22.96
1875	501	22.86
1876	444	20.18
1877	441	19.15
1878	385	16.21

"As the population of the city is larger than at any previous time, it is only reasonable to conclude from the above figures that the great work done in previous years in abating nuisances that had long been the cause of an unenvied notoriety to our city, and the greater care exercised during the past year, have been among the causes that have contributed to this happy result. Somerville now ranks, if not the first, among the first of the cities of the Commonwealth in point of healthfulness. The rate is lower than the lowest given in the Report of the State Board of Health for 1877."

In behalf of the State Board of Health,

Very respectfully yours,

CHAS. F. FOLSOM, M.D.,

Secretary.

An Act relating to Boards of Health in the Several Cities of the Commonwealth.

Be it enacted, etc., as follows: —

SECTION 1. It shall be the duty of the mayor and aldermen in each of the cities of the Commonwealth, which have not already voted to accept chapter one hundred and thirty-three [1] of the acts of the year eighteen hundred and seventy-seven, to notify and warn the legal voters of said cities to vote upon the acceptance of said act at the then next meeting in said cities respectively, for the election of city officers; *provided* the mayor and aldermen have been requested in writing so to do, thirty days prior to the time of holding said meeting, by fifty voters residing therein.

[1] Authorizing the appointment of boards of health in the cities of the Commonwealth.

Sect. 2. In case of a severe epidemic or of danger to the public health, the mayor and aldermen of any city in the Commonwealth, where there is no board of health, may appoint such a board in accordance with the provisions of chapter one hundred and thirty-three of the acts of the year eighteen hundred and seventy-seven; *provided* they have been requested to do so by one hundred voters in said city.

Sect. 3. This act shall take effect upon its passage.

Approved March 13, 1879.

Office of the State Board of Health,
State House, Boston, June, 1879.

Dear Sir, — The State Board of Health desire to very respectfully call to your notice the fact that they have been requested this year, for the first time, to edit the registration reports of the State; and they beg to earnestly ask for your co-operation in securing the enforcement of the law with reference to the collection of vital statistics, as the importance of the matter will readily occur to you.

All the necessary blanks and information in detail, including the Statistical Nosology, prepared for the International Congress by Dr. William Farr, will be furnished by the Secretary of the Commonwealth, either directly, upon application to him, or through the town or city clerk or local registrar.

Local boards of health are reminded that they can be of very great assistance in this matter, and that the registration can be made very much more accurate than at present by their means.

Any practising member of any branch of the medical profession, who may have attended a person during his last illness, is bound — if applied to within fifteen days after the decease of such person — *forthwith* to "furnish for registration a *certificate* of the duration of the last sickness, the disease of which the person died, and the date of the decease, as nearly as he can state the same." *Penalty for non-compliance*, — ten dollars.

No undertaker or sexton or other person is allowed to bury any body, or to remove it from one town to another for burial, without a permit to do so from the town or city clerk or local registrar; and this permit must not be given until the undertaker or person performing the burial or removing the body has obtained from the physician attending, or from the board of health, or from the physician acting for the board of health, a certificate giving the cause of death, as required by statute. Local boards of health can make arrangements to have these certificates of the causes of death approved by themselves.

In order to facilitate the effective operation of the law, it is earnestly recommended that the medical practitioner who has been in attendance at the death, or during the last illness, of any person, shall *place his certificate of the cause of death, immediately*[1] *after such death, in the hands of some person in attendance, or of some member of the household in which the*

[1] Allowing reasonable time, of course, for cases where there are to be autopsies.

death occurred, for the use of the undertaker or other informant in making return of the death to the town clerk or registrar.

Physicians and local boards of health are respectfully desired to observe the provision in our laws *with regard to births*, and to further in every way in their power the collection of accurate statistics of them. This they can do by themselves sending notice of births; by telling families of their patients what a duty they have to perform; and by showing how important it is that the statistics should be returned *promptly* and *correctly*.

Parents are required by the law to give notice to the clerk of the births of their children; householders, to give notice of every birth happening in their houses; masters of ships, keepers of workhouses, houses of correction, prisons, hospitals, almshouses, — except the three State almshouses, — to give like notice of every birth happening among the persons under their respective charges, *under penalty of a sum not exceeding five dollars* for neglect to give such notice for the space of six months after each event. Parents and other relatives of children born, and the occupiers of tenements in which any births may take place, are requested to report to the clerk or registrar, *as soon after the event as may be, every case of birth* which may occur, including *all still births*.

In behalf of the State Board of Health,

Very respectfully yours,

Charles F. Folsom, M.D.,
Secretary.

As a result of facts mentioned in the circular on House-Drainage, the local Board of Health of Edgartown have undertaken an investigation with regard to their water-supply and drainage. The State Board have found it necessary to condemn four of the wells in that town as containing an amount of human excrement rendering them dangerous to the public health; and the local board have enforced their order. It has seemed fair to attribute a considerable amount of illness to the use of water from two of the wells; a third was used for a bakery, and the fourth for many transient boarders: so that it is impossible to say how far they may or may not have distributed the seeds of disease. The investigation is still going on under the direction of the Board; and it may prove necessary to condemn other wells, in order to give full security to the thousands of visitors to the town. The local board have issued stringent regulations to prevent an accumulation of filth, which in former years has been excessive, and a source of stenches.

Each year the work of the Board has increased very much in conferring with local boards as to their powers under the

law, and in giving advice with regard to individual complaints, or sources of foul odors and ill health. As more and more towns organize boards of health, there would naturally be more of such work to be done. Indeed, the Board, in the ten years of their existence, have as yet hardly been able to more than prepare the community to see the necessity of concerted action to prevent disease; and, in some form or other, that work must go on.

The establishment of the National Board of Health, their conference with official delegates of the various state boards of health at a meeting called for that purpose in Atlanta, and the successful organization of the Sanitary Council of the Mississippi Valley, composed of the state and municipal boards of health of that valley, for the purpose of preventing the inroad of dangerous diseases, mark a progress in the estimation of the nation of wise measures to prevent disease, and are most encouraging signs for the future.

The correspondence of the Board, and their exchanges of sanitary publications with other boards, in this country and in Europe, have increased very much, so as to place them now in relations with a large part of both countries. Indeed, the library collected, partly in this way, and partly by purchase, — embracing, too, many volumes of letters from sanitarians and others, — is often consulted for the benefit of physicians and boards of health. It has proved of increasing usefulness each successive year.

The following list comprises the subjects upon which special investigations and reports have been made, the results of which were published in the series of reports: —

SLAUGHTER-HOUSES, ETC.

First Report. — Slaughtering for the Boston Market. By Dr. George Derby, Secretary.

Third Report. — Slaughtering, Bone-Boiling, and Fat Melting. By Dr. George Derby, Secretary.

Fourth Report. — Report of the Butchers' Slaughtering and Melting Association. By J. N. Merriam, President.

Fifth Report. — The Brighton Abattoir. Report of the President. Description of the Abattoir. Letter from Mr. J. S. Schultz, describing European Abattoirs in 1873.

Sixth Report. — Our Meat-Supply and Public Health. By Dr. C. F. Folsom, Secretary. The Transportation of Live-Stock. By J. C. Hoadley, Member of the Board. The Brighton Abattoir. By J. N. Merriam, President.

Tenth Report. — "The City of Cambridge *v.* Niles Brothers." Report of the Evidence taken before the State Board of Health.

PUBLIC HEALTH, ETC.

First Report. — Report on the Sale of Poisons. By the Board. The Prevention of Disease. By Dr. George Derby, Secretary.

Second Report. — Poisoning by Lead Pipe. By Dr. George Derby, Secretary, and Professor W. R. Nichols. Health of Minors employed in Factories. By Dr. George Derby, Secretary, and Dr. F. W. Draper. Ventilation of Schoolhouses. By A. C. Martin, Architect. Air and Some of its Impurities. By Dr. George Derby, Secretary, and Messrs. A. H. Pearson, H. B. Hill, and C. Stodder. The Use and Abuse of Intoxicating Liquors: Correspondence. Houses for the People. Convalescent Homes and the Sewage Question. By Dr. H. I. Bowditch, Chairman of the Board.

Third Report. — Arsenic in Certain Green Colors. By Dr. F. W. Draper. The Effects on Health of the Use of Sewing-Machines moved by Foot-Power. By Dr. A. H. Nichols. The Use and Abuse of Intoxicating Liquors: Analysis of the Correspondence. By Dr. H. I. Bowditch, Chairman of the Board. The Use and Abuse of Opium. By Dr. F. E. Oliver. Mill-Dams and Other Water Obstructions: Effect on Health. By Dr. George Derby, Secretary.

Fourth Report. — Infant Mortality. By Dr. E. Jarvis. Some of the Causes or Antecedents of Consumption: Analysis of a Correspondence. By Dr. H. I. Bowditch, Chairman of the Board. The Homes for the Poor in our Cities. By Dr. F. W. Draper. Beer-Shops and Prohibitory Laws. By P. E. Aldrich, Member of the Board.

Fifth Report. — On the Use of Zinced or Galvanized Iron for the Storage or Conveyance of Drinking-Water. By Dr. W. E. Boardman. Hospitals. By Dr. George Derby, Secretary. School Hygiene. By Dr. F. Winsor. The Work of Local Boards of Health. By Dr. A. Ames, jun. Preventive Medicine and the Physician of the Future. By Dr. H. I. Bowditch, Chairman of the Board. Political Economy of Health. By Dr. E. Jarvis. The Health of the Farmers of Massachusetts. By Dr. J. F. A. Adams. Some Farm-Houses, and some Mistaken Ways of living in them. By Mrs. T. F. Plunkett.

Sixth Report. — Cremation and Burial: An Examination of their Relative Advantages. By Dr. J. F. A. Adams. The Value of Health to the State. By Dr. W. E. Boardman. Inebriate Asylums or Hospitals. By Dr. H. I. Bowditch, Chairman of the Board. Ventilation of Railroad-Cars. By Dr. T. W. Fisher: With Chemical Analyses of the Air in Cars. By Professor W. R. Nichols. Composition of the Air of the Ground Atmosphere. By Professor W. R. Nichols.

Seventh Report. — Registration of Prevalent Diseases. By Dr. F. W. Draper. Sanitary Hints. By Dr. H. I. Bowditch, Chairman of the Board.

Eighth Report. — The Growth of Children. By Professor H. P. Bowditch. Registration of Deaths and of Diseases. By Dr. C. F. Folsom, Secretary.

Ninth Report. — Sanitation of Public Schools in Massachusetts. By Dr. D. F. Lincoln. Dangers from Color-Blindness. By Dr. B. Joy Jeffries. Cottage Hospitals. By Dr. J. F. A. Adams.

Tenth Report. — Physical Education in Amherst College. By Professor E. Hitchcock, M.D. The Growth of Children. By Professor H. P. Bowditch. Coal-Gas from Heating-Apparatus. By Dr. F. Winsor. A Contribution to the Study of Ventilation. By Dr. E. Cowles.

DISEASES AND THEIR PREVENTION.

Second Report. — Health of Towns.

Third Report. — Health of Towns.

Fourth Report. — Health of Towns.

Fifth Report. — Health of Towns.

Sixth Report. — Health of Towns.

Seventh Report. — Health of Towns.

Eighth Report. — Health of Towns.

Ninth Report. — Health of Towns.

Tenth Report. — Health of Towns, Boards of Health, Water-Supplies, Prevalent Diseases, Circular on Drainage, etc.

Second Report. — Mortality of Boston in 1870. By Dr. George Derby, Secretary, assisted by Dr. F. W. Draper. Trichiniasis in Massachusetts. By Dr. George Derby, Secretary. Charbon, or Malignant Pustule, in Massachusetts. By Dr. A. H. Nichols. Typhoid Fever in Massachusetts. By Dr. George Derby, Secretary.

Third Report. — Small-Pox in Massachusetts. By Dr. George Derby, Secretary.

Fifth Report. — Typhoid Fever in Medford in 1873. By Dr. A. H. Nichols. The Epidemic of Cerebro-Spinal Meningitis in Massachusetts in 1873. By Dr. J. B. Upham. Small-Pox in Spencer in 1873. By Dr. F. W. Draper.

Sixth Report. — Report on the Sanitary Condition of the State Prison at Charlestown. By the Board.

Seventh Report. — Health of Boston in 1875. By Dr. F. E. Oliver. Health of Lowell in 1875. By Dr. F. Nickerson. Report on an Outbreak of Intestinal Disorder, attributable to the Contamination of Drinking-Water by Means of Impure Ice (Rye Beach, N.H.). By Dr. A. H. Nichols.

Eighth Report. — The Sanitary Condition of Lynn. By Dr. J. G. Pinkham. Diphtheria in Lynn. By Dr. J. G. Pinkham. Diphtheria in Salem. By Dr. A. H. Johnson. Diphtheria in Lowell. By Dr. F. Nickerson.

Ninth Report. — Diphtheria in Gloucester. By Dr. C. F. Folsom, Secretary. Diphtheria in Taunton. By Dr. A. S. Deane. Typhoid Fever in Taunton, Raynham, Saugus. By Dr. C. F. Folsom, Secretary.

The Sanitary Condition of Cambridge. By Dr. E. R. Cogswell. Scarlet Fever. By Dr. A. H. Johnson. Vegetable Parasites, and the Diseases caused by their Growth upon Man. By Dr. J. C. White.

FOOD AND DRINK.

Second Report. — On the Use of Milk from Cows affected with "Foot-and-Mouth Disease." By Dr. A. H. Nichols.

Third Report. — The Adulterations and Impurities of Food. By Professor H. B. Hill.

Fourth Report. — Character of Substances used for flavoring Articles of Food and Drink. By Dr. H. K. Oliver. The Food of the People of Massachusetts. By Dr. George Derby, Secretary. The Adulteration of Milk. By Dr. A. H. Nichols and Professor J. F. Babcock. The Adulterations and Impurities of Food. By Professor H. B. Hill.

Ninth Report. — The Filtration of Potable Water. By Professor W. R. Nichols.

INSANITY, AND PROVISION FOR THE INSANE.

Third Report. — Proper Provision for the Insane. By Dr. E. Jarvis.

Eighth Report. — Disease of the Mind. By Dr. C. F. Folsom, Secretary.

Tenth Report. — Hospital Homes for the Insane. By Dr. T. S. Clouston.

DRAINAGE, SEWERAGE, POLLUTION OF STREAMS, ETC.

Second Report. — Pollution of Mystic-Pond Water. By Dr. George Derby, Secretary, and Professor W. R. Nichols.

Fourth Report. — Sewerage; Sewage; the Pollution of Streams; the Water-Supply of Towns. By Dr. George Derby, Secretary, and Professor W. R. Nichols. Drainage for Health. By H. F. French.

Fifth Report. — On the Present Condition of Certain Rivers of Massachusetts, together with Considerations touching the Water-Supply of Towns. By Professor W. R. Nichols.

Seventh Report. — A Special Report on (1) The Pollution of Rivers; an Examination of the Water-Basins of the Blackstone, Charles, Taunton, Neponset, and Chicopee Rivers, with General Observations on Water-Supplies and Sewerage. By J. P. Kirkwood, C.E. With an Appendix giving Chemical Analyses. By Professor W. R. Nichols. (2) The Water-Supply, Drainage, and Sewerage of the State from the Sanitary Point of View. By Dr. F. Winsor. (3) The Disposal of Sewage. By Dr. C. F. Folsom, Secretary. (4) Summary and Recommendations. By the Board. Surface-Drainage of the Metropolitan District. By C. W. Folsom, C.E. Defects in House-Drainage, and their Remedies. By E. S. Philbrick, C.E.

Eighth Report. — Sewerage: its Advantages and Disadvantages, Construction and Maintenance. By E. S. Chesbrough, C.E. The Pollution of Streams; Disposal of Sewage, etc. By Dr. C. F. Folsom,

Secretary: With Chemical Examinations. By Professor W. R. Nichols: and a Map of the Nashua-River Basin. By E. K. Clark, C.E.

Ninth Report. — Drainage and Health: Sewerage and the Pollution of Streams; including the Draught of a Law. By the Board.

Tenth Report. — Common Defects in House-Drains. By E. C. Clarke, C.E.

These matters were treated of, also, at greater or less length by the Board, in their general reports for the several years, where they have also considered the following subjects: —

MODEL LODGING-HOUSES AND TENEMENT-HOUSES.

First Report. — Comparison of their Relative Effects upon the Health and Morals of the People.

Second Report. — Overcrowding of Tenement Houses, and Want of Clean Streets in Boston.

Third Report. — Model Lodging and Low Tenement Houses.

INTOXICATING LIQUORS.

First Report. — Their Use as a Beverage.

Tenth Report. — Intemperance.

SLAUGHTER-HOUSES, ETC.

Third Report. — Law concerning Slaughter-Houses and Noxious and Offensive Trades: Doings of the Board under said Law.

Fourth Report. — The Same

Fifth Report. — The Same.

Sixth Report. — The Same.

Seventh Report. — The Same.

Eighth Report. — The Same.

Ninth Report. — The Same.

Tenth Report. — The Same.

Third Report. — The Brighton Butchers and the Proposed Abattoir.

Fourth Report. — Butchers' Slaughtering and Melting Association.

Fifth Report. — The Brighton Abattoir.

Sixth Report. — The Brighton Abattoir.

Seventh Report. — The Abattoir and the Slaughter-Houses in Brighton.

DRAINAGE, SEWERAGE, SEWAGE, ETC.

Second Report. — Pollution of Streams.

Fourth Report. — Miller's-River Commission; Sewerage of the Metropolitan District.

Fifth Report. — Sewerage of the Metropolitan District; Miller's-River District in Cambridge and Somerville.

Sixth Report. — Drains and Sewers.

Eighth Report. — Pollution of Streams; Disposal of Sewage, etc.

Ninth Report. — Drainage and Sewerage; Sewage of Concord State Prison; Pollution of Streams; Summary of Bill; Pollution of Streams.

Tenth Report. — The Disposal of Sewage; Sewerage of the Worcester Lunatic Hospital; Danvers Lunatic Asylum; Concord State Prison, and the Women's Prison at Sherborn.

PUBLIC HEALTH.

First Report. — The Condition of "Lock-ups."

Second Report. — The Foot-and-Mouth Disease in Cattle: its Effects on Man; Small-Pox in Massachusetts; Sewing-Machines: Influence on Health of Female Operatives.

Third Report. — The Influence of Mill-Ponds on Health; Record of Sickness.

Fourth Report. — A Receiving-Tomb in the Vicinity of Houses; Revision and Codification of Health Laws; Boards of Health; Small-Pox.

Fifth Report. — Undrained Land; Excavations in Clay Lands; Asiatic Cholera; Small-Pox.

Sixth Report. — Charcoal Pits; Registration of Disease; Local Boards of Health; Hydrographical Survey; The Sale and Use of Poisons; Investigation of Alleged Sickness from Low Water in "Little Pond."

Eighth Report. — Supervision of the Insane.

Ninth Report. — Boards of Health; Vital Statistics; Circulars on Hydrophobia, Scarlet Fever, and Diphtheria.

Tenth Report. — Yellow Fever in 1878; Poisoning by Arsenic; Boards of Health; Vital Statistics; Supervision of the Insane; Syphilis and Prostitution; The Law appointing Medical Examiners; Regulation of the Practice of Medicine; Impure Ice, not freed from Impurities by Freezing.

Many subjects are still under consideration, upon several of which a considerable amount of work has already been done. Under the new law, the duties of the Health Department will be increased — as was proposed by the Board some time ago — by the sanitary supervision of the public institutions of the State.

The topics which seem to demand the most immediate attention and investigation are, —

A digest of the laws of public health of the State, for the use of local boards of health.

A survey of the river-basins of the State, in continuation of the study of pollution of streams.

An investigation into the question of the relation of privies to wells.

An examination of the Merrimack River and Mystic Pond

as sources of water-supply, and, so far as possible, the sanitary condition of the cities situated upon them.

A concise series of regulations, to be published under the direction of the Board, to be followed out in works of water-supply, house-drainage, sewerage, and disposal of sewage.

The relation of diseases of animals, especially of swine, cows, and horses, to men; the dangers therefrom, and the means of obviating them.

Adulteration of food.

Arsenic.

This list comprises only a small portion of the subjects under consideration, and it is hoped that it will be possible to take up the others in their proper time.

All of which is very respectfully submitted.

HENRY I. BOWDITCH.
ROBERT T. DAVIS.
RICHARD FROTHINGHAM.
DAVID L. WEBSTER.
JOHN C. HOADLEY.
THOMAS B. NEWHALL.
CHARLES F. FOLSOM.

THE expenses of the Board for the half year are as follows: —

Printing and stationery	$326 90
Postage and stationery	262 70
Travelling expenses	198 22
Carriage and horse hire	51 50
Messenger	45 25
Books and binding	41 80
Express	15 50
Plans for hospital	15 00
Gas-fixtures	4 42
Repairing curtains	1 00
Ink	50
Expert to visit Weymouth	10 00
T. H. Hay, clerk	275 00
	$1,247 79

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VOLUMES I.–XI.

BY

FRANCIS H. BROWN, M.D.,

BOSTON.

GENERAL INDEX.

Towns, Diseases, Typhoid fever — *Continued.*